



Bad Ethics – Bad Engineering

Towards Zero Deaths- Spring Workshops – May 23 & 30, 2018

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Agenda

Act 1	Flint Sets the Stage
Act 2	Case Studies
Act 3	Ethical Choices (and why whistleblowers get ignored)



Detour: What were they thinking?

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Makes Sense....



Photoshop?



Crazy Crosswalk!



Where the sidewalk (abruptly) ends



Marking Crew Should Go Back to “School”



Umm.....anyone see a problem here?



Awkward.....



Flint Sets the Stage

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Flint Water Crisis



Engineer Marc Edwards Talks About Flint

- “The perpetrators and the federal government who caused the DC lead crisis covered it up every step of the way. If it comes down to a decision between their reputation and the truth, the truth will lose every single time with these agencies, because they are not rewarded for being loyal to the human race. They’re rewarded for being loyal to their agency.”

- “We are in an era where the pie (for infrastructure) is getting smaller. That is going to create unprecedented pressure on all aspects of science and engineering.”
- “What do we value as a society? From my perspective, critical infrastructure, you have to advocate for that, because without it, civilization is lost. That’s what happened in Flint. They lost their ability to get clean water.”

- “Science really is this amazing tool that if it’s done properly you will more often than not reach the correct conclusion. But to the extent that you let down your guard and lack moral humility, you will wake up some day having done something horrible, even though you started down the path with the best of intentions.”

- “Ethics Education in this country is 100% wrong in how it’s approached. (It’s presented) like a chess game and if you know the rules, you’ll win. That’s not the real world. Real-world ethical dilemmas are gut-wrenching, life-changing experiences that require you to put yourself in harm’s way to do the right thing. What class in ethics is teaching students that fact?”



The Press Conference Experiment

- “The (Catholic Church) whistleblowers did not get pleasure from pointing out that their colleagues were pedophiles. But what is the cost of not speaking out? The cost is people get hurt. The cost is you end up damaging the institution you love even more. It wasn’t until the public learned about it that they finally had no choice but to get this fixed.”



Case Studies

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Trinity Guardrail Case



FIU Pedestrian Bridge



Quebec Bridge Collapse - 1907

Commission Findings

- Chords failed due to defective design
- Dead loads calculated were too low and should have been revised
- Quebec Bridge Company's failure to hire experienced engineer was a contributing factor
- The state of knowledge concerning the actions of steel columns under load was insufficient to enable engineers to effectively design such a bridge

- Though never on site, everyone deferred to Cooper.
- Cooper made spec changes without review by anyone else.
- The deformations went unheeded while engineers argued about potential causes
- Cooper rejected have an independent engineer review his work – that review might not have allowed the higher than normal design stresses



Tacoma Narrows Bridge Collapse

Federal Works Agency Review

“The Tacoma Narrows bridge failure has given us invaluable information...It has shown [that] every new structure [that] projects into new fields of magnitude involves new problems for the solution of which neither theory nor practical experience furnish an adequate guide. It is then that we must rely largely on judgment and if, as a result, errors, or failures occur, we must accept them as a price for human progress.”

Are “errors or failures” an acceptable price for human progress in all instances? Are they really acceptable where there is a serious risk to life and/or of great financial loss? This is the ethical issue raised by the Tacoma Narrows Bridge collapse.

Engineers employ two types of knowledge:

Theoretical (i.e. physics)

Experiential (the body of knowledge acquired by the profession over the years and passed from one generation to the next). This knowledge can be comfortably employed by engineers if it has been successfully employed in the past.

The dilemma posed in design of the Tacoma Narrows Bridge was that a theoretical analysis was used as the basis for a design decision (to use the 8-foot deep solid girders) when there was inadequate recognized theory upon which to rely in design of the bridge. In the absence of adequate theoretical knowledge, then, the design should have been controlled by adequate experiential knowledge.

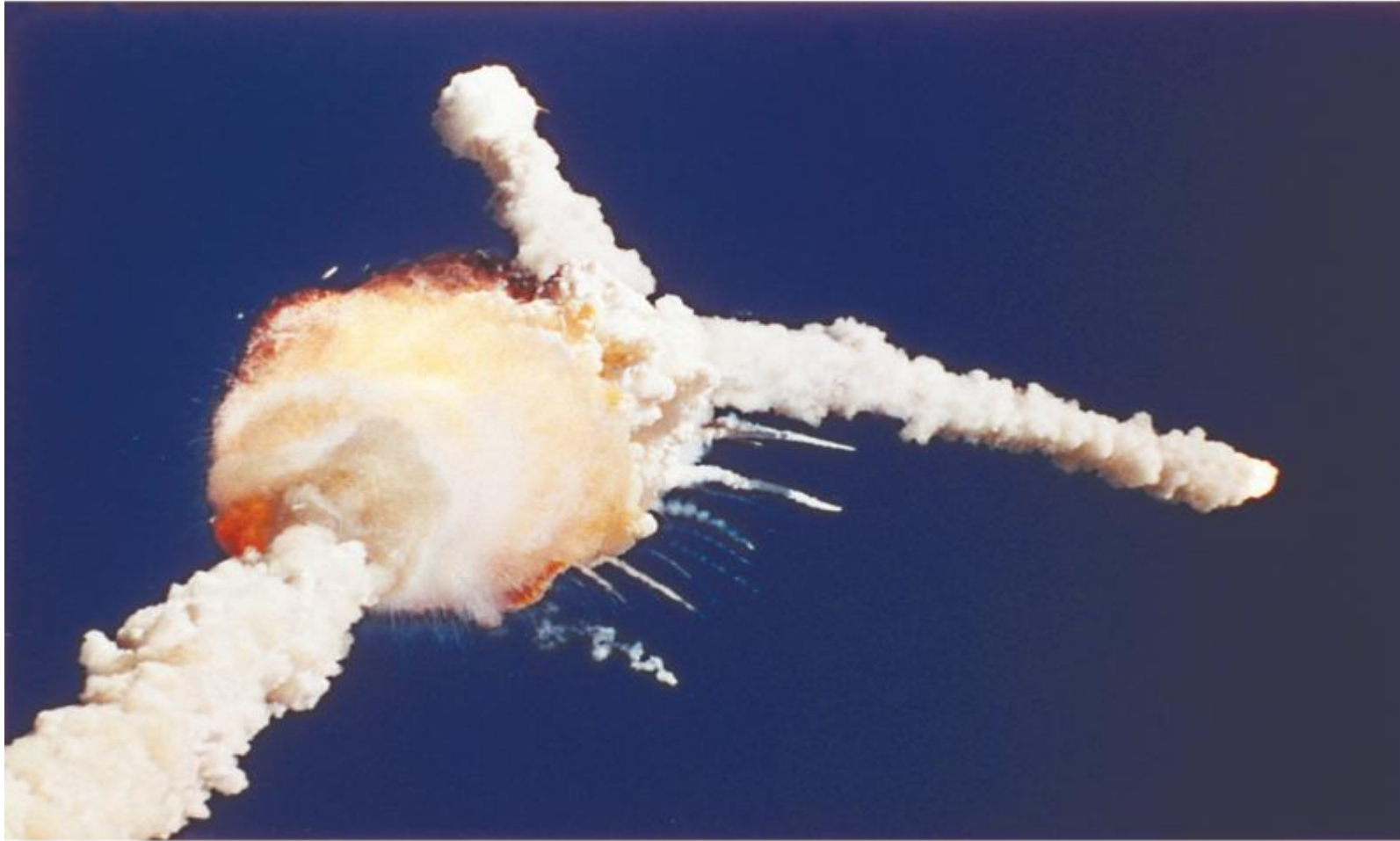
- If the theoretical knowledge base underlying a design is weak or incomplete, it must be supplemented by an adequate base of experiential knowledge.
- • If the experiential knowledge base is weak or incomplete it must be expanded until it is adequate. A principal way of practicably doing this is through appropriate modeling. In the example of the Tacoma Narrows Bridge, the modeling that might have prevented the collapse was wind tunnel model testing.
- • In competing for engineering contracts, do not propose designs that are not *ipso facto* supported by an adequate and complete theoretical and/or experiential knowledge base.



KC Hyatt Skywalk – 37 Years Later



KC Hyatt Skywalk Memorial



NASA and the Incremental Descent into Poor Judgment

Public Agencies – The Balancing Act





Ethical Choices (and why do we ignore whistleblowers?)

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Why do people act unethically?

- There's usually some type of **pressure**:
 - MONEY
 - Time
 - Need to fit into organization and culture – don't rock the boat
- History of practice – i.e. hasn't been caught or suffered consequences
- Belief you can get away with it
- Don't believe there's a real cost

Peter Drucker 's Three-Step Process

- Analyze Consequences
 - Who will be helped/hurt?
 - Benefits and harms
 - Long-run vs. short-term
- Analyze Actions
 - Consider all options from a different perspective
 - How do actions stack up against moral principles?
 - How does it affect other people (the “common good”)
 - Which option has least or least serious problems
- Decide



Whistleblower Ignored

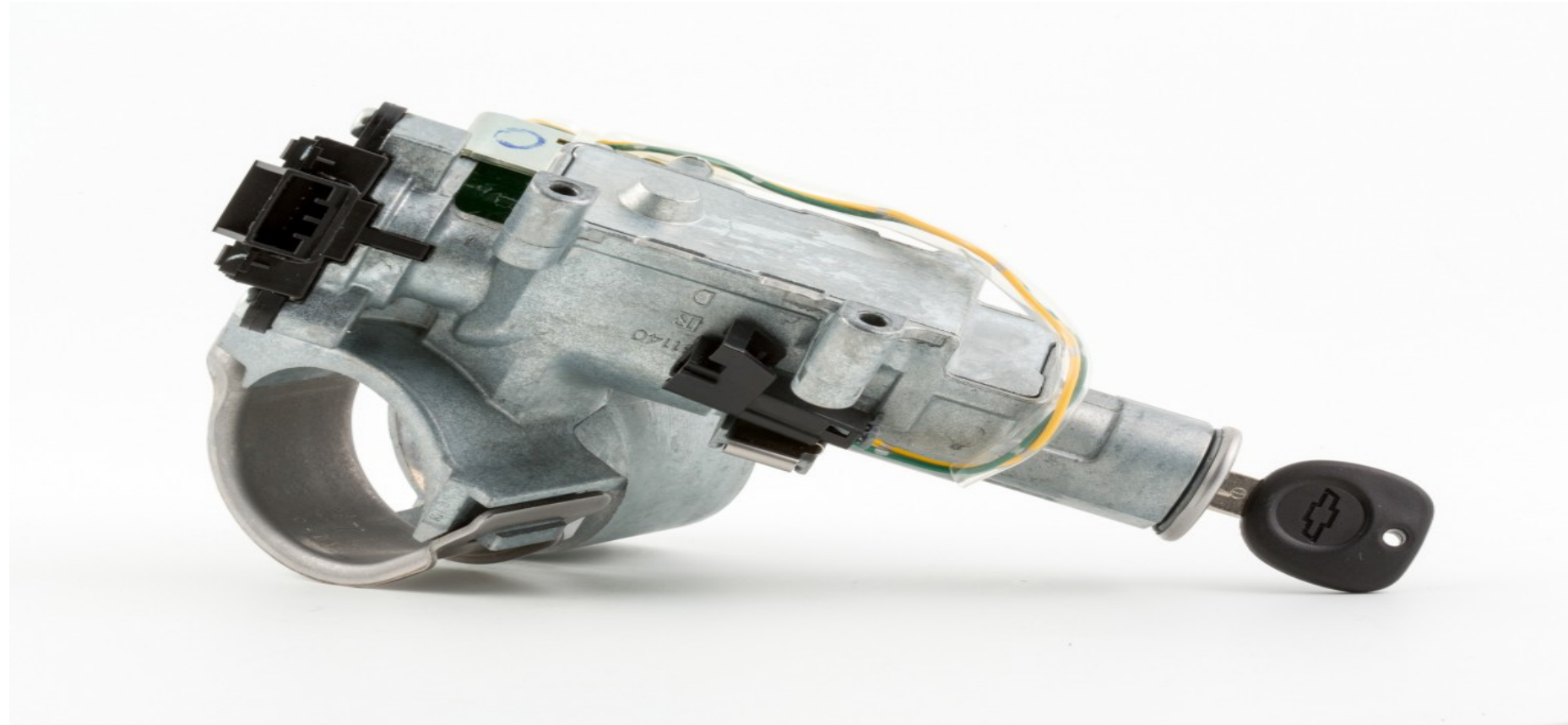
The Wells Fargo logo consists of the words "WELLS" and "FARGO" stacked vertically in a yellow, serif font, centered within a solid red rectangular background.

WELLS
FARGO

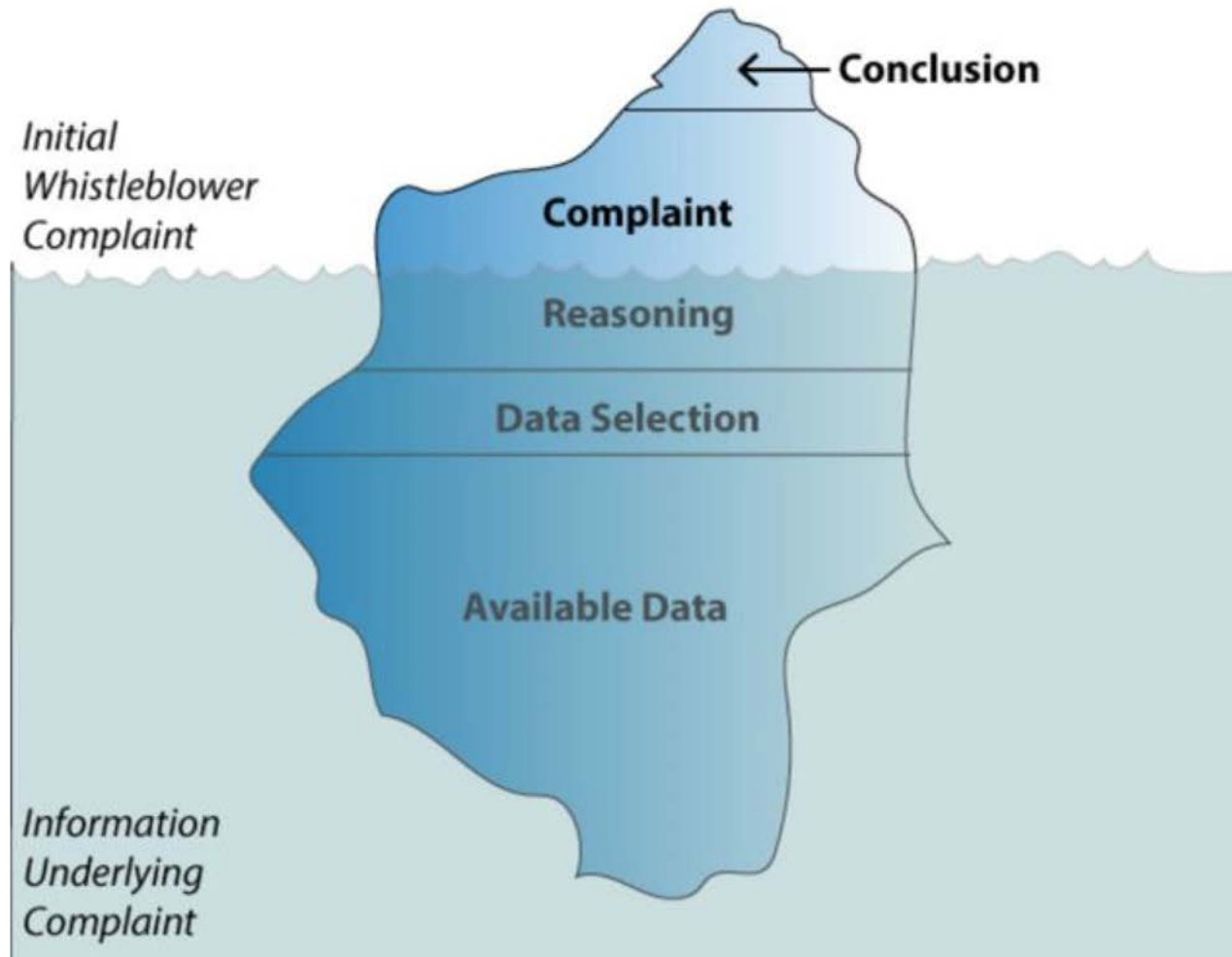
Whistleblower Ignored



Why are Whistleblowers Ignored?



GM Ignition Switch



The Whistleblower Iceberg

Ethical “tone” flows from the top down

Four Steps to Set the Tone:

Communicate Expectations

Lead by Example

Provide a Reporting Mechanism

Reward Integrity

Traits of Ethical Organizations

Values statement is authentic and applied

Strong leadership sets tone at top

Integrity

Respect – treat employees as partners

Emphasize moral principle over legal compliance

Build relationships

Chrysler/Fiat & UAW – Consequences of Ethical Lapses



What can you do?

- Talk to trusted colleague or friend
- Gather support to help counteract pressure
- Research – collect information on how others have addressed similar issues
- Document – contemporaneously
 - Dates, times, facts (not feelings), conversations, decisions, warnings given
- Brainstorm solutions – is it really just “A or B” or might it be “A or B or C or D”
- Consider consequences of staying in situation vs removing yourself from situation



Conclusion

Thank you again!

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